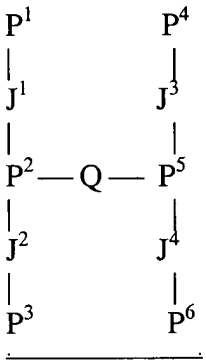
Amendments to the Claims

Claim 1 (Currently amended): An apparatus for storing data, said apparatus comprising:

a fixed electrode electrically coupled to

a storage medium having a multiplicity of different and distinguishable oxidation states wherein data is stored in said oxidation states by the addition or withdrawal of one or more electrons from said storage medium via the electrically coupled electrode, wherein said storage medium comprises a molecule having the formula:



where J^1, J^2, J^3, and J^4 are independently selected linkers that permit electron transfer between the porphyrinic macrocycles;

P^1 and P^2 are porphyrinic macrocycles selected to have the same oxidation state;

P^4 and P^6 are porphyrinic macrocycles selected to have the same oxidation state;

P^2 has an oxidation potential greater than the oxidation potential of P^1 or P^3;

P^5 has an oxidation potential greater than the oxidation potential of P^4 or P^6; and

Q is a linker.

Claim 2 (Original): The apparatus of claim 1, wherein said storage medium stores data at a density of at least one bit per molecule.

Claim 3 (Original): The apparatus of claim 1, wherein said storage medium comprises a molecule having at least two different and distinguishable oxidation states.

Claim 4 (Canceled).

Claim 5 (Original): The apparatus of claim 1, wherein said storage medium is covalently linked to said electrode.

Claim 6 (Original): The apparatus of claim 1, wherein said storage medium is electrically coupled to said electrode through a linker.

Claim 7 (Original): The apparatus of claim 1, wherein said storage medium is covalently linked to said electrode through a linker.

Claim 8 (Original): The apparatus of claim 7, wherein said linker is a thiol linker.

Claim 9 (Original): The apparatus of claim 1, wherein said storage medium is juxtaposed in the proximity of said electrode such that electrons can pass from said storage medium to said electrode.

Claim 10 (Original): The apparatus of claim 1, wherein said storage medium is juxtaposed to a dielectric material imbedded with counterions.

Claim 11 (Original): The apparatus of claim 1, wherein said storage medium and said electrode are fully encapsulated in an integrated circuit.

Claim 12 (Original): The apparatus of claim 1, wherein said storage medium is electronically coupled to a second fixed electrode that is a reference electrode.

Claim 13 (Original): The apparatus of claim 1, wherein said storage medium is present on a single plane in said device.

Claim 14 (Original): The apparatus of claim 1, wherein said storage medium is present at a multiplicity of storage locations.

Claim 15 (Original): The apparatus of claim 14, wherein said storage locations are present on a single plane in said device.

Claim 16 (Original): The apparatus of claim 14, wherein said apparatus comprises multiple planes and said storage locations are present on multiple planes of said device.

Claim 17 (Original): The apparatus of claim 14, wherein said storage locations range from about 1024 to about 4096 different locations.

Claim 18 (Original): The apparatus of claim 17, wherein each location is addressed by a single electrode.

Claim 19 (Original): The apparatus of claim 17, wherein each location is addressed by two electrodes.

Claim 20 (Original): The apparatus of claim 1, wherein said electrode is connected to a voltage source.

Claim 21 (Original): The apparatus of claim 20, wherein said voltage source is the output of an integrated circuit.

Claim 22 (Original): The apparatus of claim 1, wherein said electrode is connected to a device to read the oxidation state of said storage medium.

Claim 23 (Original): The apparatus of claim 22, wherein said device is selected from the group consisting of a voltammetric device, an amperometric device, and a potentiometric device.

Claim 24 (Original): The apparatus of claim 23, wherein said device is an impedance spectrometer or a sinusoidal voltammeter.

Claim 25 (Original): The apparatus of claim 22, wherein said device provides a Fourier transform of the output signal from said electrode.

Claim 26 (Original): The apparatus of claim 22, wherein said device refreshes the oxidation state of said storage medium after reading said oxidation state.

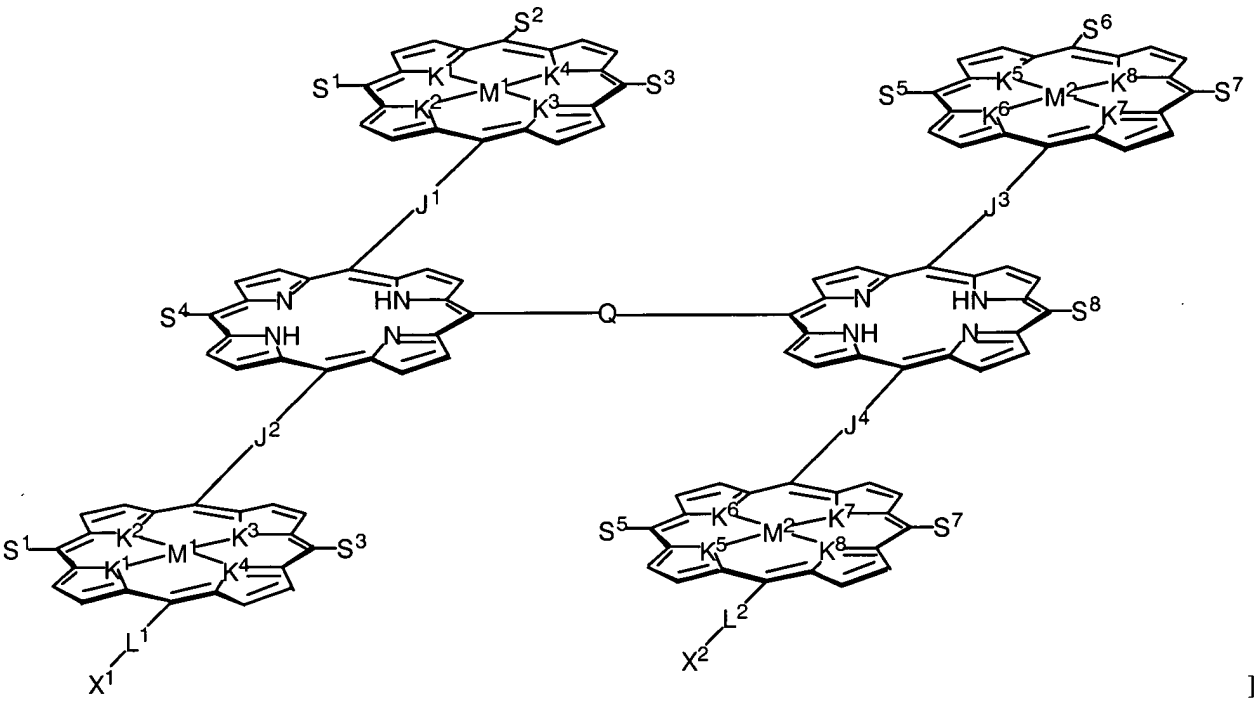
Claim 27 (Original): The apparatus of claim 1, wherein said different and distinguishable oxidation states of said storage medium can be set by a voltage difference no greater than about 2 volts.

Claims 28-29 (Canceled).

Claim 30 (Original): The apparatus of claim 29, wherein said storage medium comprises a porphyrinic macrocycle substituted at a β- position or at a *meso*- position.

Claims 31-40 (Canceled).

Claim 41 (Currently amended): The apparatus of claim ~~39~~ 1, wherein said storage medium comprises a molecule having the formula:



]

wherein

M^1 and M^2 are independently selected metals;

S^1, S^2, S^3, S^4, S^5, S^6, S^7, and S^8 are independently selected from the group consisting of aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, imido, amido, and carbamoyl;

K^1, K^2, K^3, K^4, K^5, K^6, K^7, and K^8 are independently selected from the group consisting of are independently selected from the group consisting of N, O, S, Se, Te, and CH;

L^1 and L^2 are independently selected linkers; and

X^1 and X^2 are independently selected from the group consisting of a substrate, a reactive site that can covalently couple to a substrate, and a reactive site that can ionically couple to a substrate.

Claim 42 (Original): The apparatus of claim 41, wherein

S^1, S^2, S^3, S^5, S^6, and S^7 are the same;

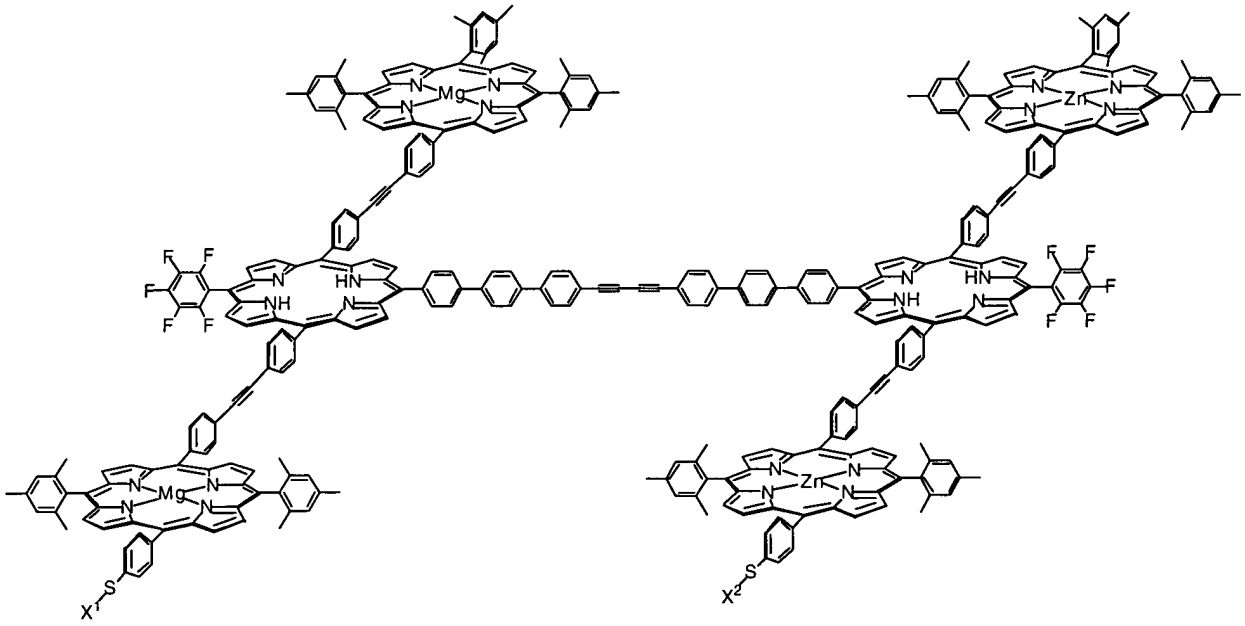
S^4 and S^8 are the same;

K^1, K^2, K^3, K^4, K^5, K^6, K^7, and K^8 are the same

J^1, J^2, J^3 and J^4 are the same; and

M^1 and M^2 are different.

Claim 43 (Original): The apparatus of claim 42, wherein said storage medium comprises a molecule having the formula:

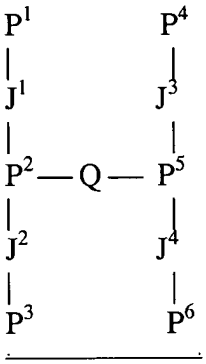


wherein X^1 and X^2 are independently selected from the group consisting of H and a substrate.

Claims 44-59 (Canceled).

Claim 60 (Currently amended): An information storage medium, said storage medium comprising a one or more storage molecules such that said storage medium has at least two different and

distinguishable non-neutral oxidation states, wherein said one or more storage molecules comprises a molecule having the formula:



where J^1, J^2, J^3, and J^4 are independently selected linkers that permit electron transfer between the porphyrinic macrocycles;

P^1 and P^2 are porphyrinic macrocycles selected to have the same oxidation state;

P^4 and P^6 are porphyrinic macrocycles selected to have the same oxidation state;

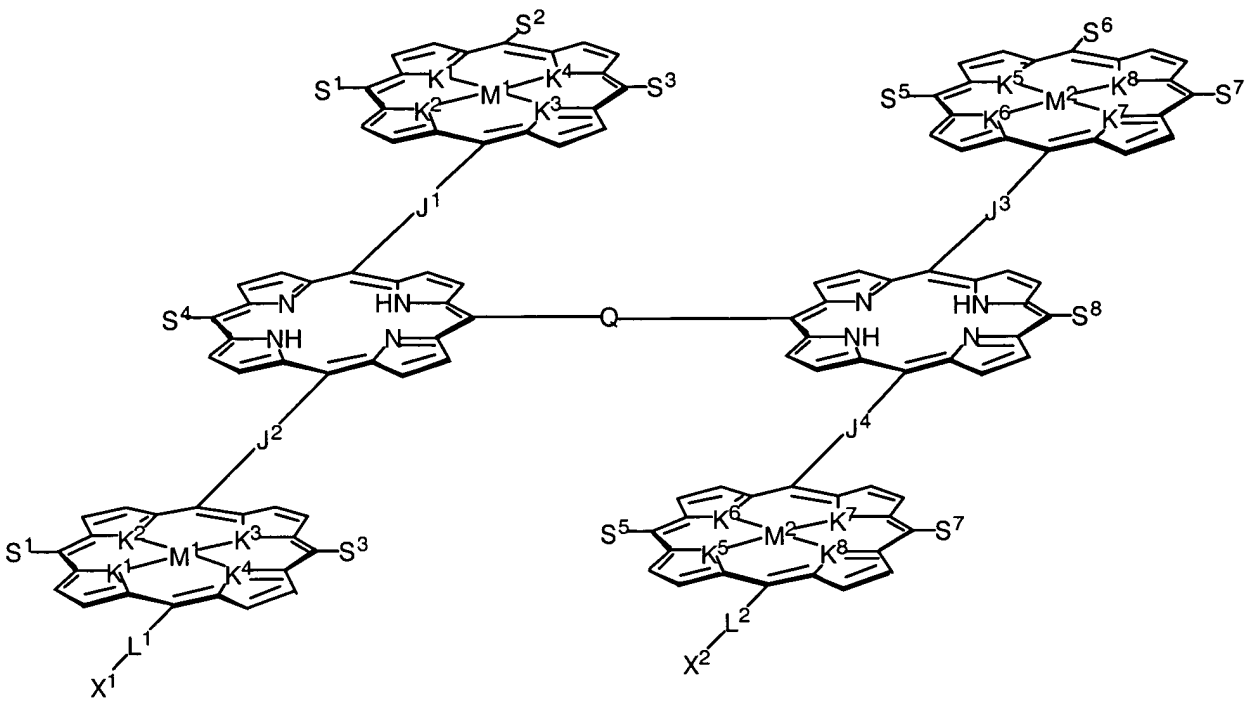
P^2 has an oxidation potential greater than the oxidation potential of P^1 or P^3;

P^5 has an oxidation potential greater than the oxidation potential of P^4 or P^6; and

Q is a linker.

Claims 62-69 (Canceled).

Claim 70 (Currently amended): The storage medium of claim ~~69~~ 60, wherein said storage molecule has the formula:



wherein

M^1 and M^2 are independently selected metals;

S^1, S^2, S^3, S^4, S^5, S^6, S^7, and S^8 are independently selected from the group consisting of aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, imido, amido, and carbamoyl;

K^1, K^2, K^3, K^4, K^5, K^6, K^7, and K^8 are independently selected from the group consisting of are independently selected from the group consisting of N, O, S, Se, Te, and CH;

L^1 and L^2 are independently selected linkers; and

X^1 and X^2 are independently selected from the group consisting of a substrate, a reactive site that can covalently couple to a substrate, and a reactive site that can ionically couple to a substrate.

Claim 71 (Original): The storage medium of claim 70, wherein

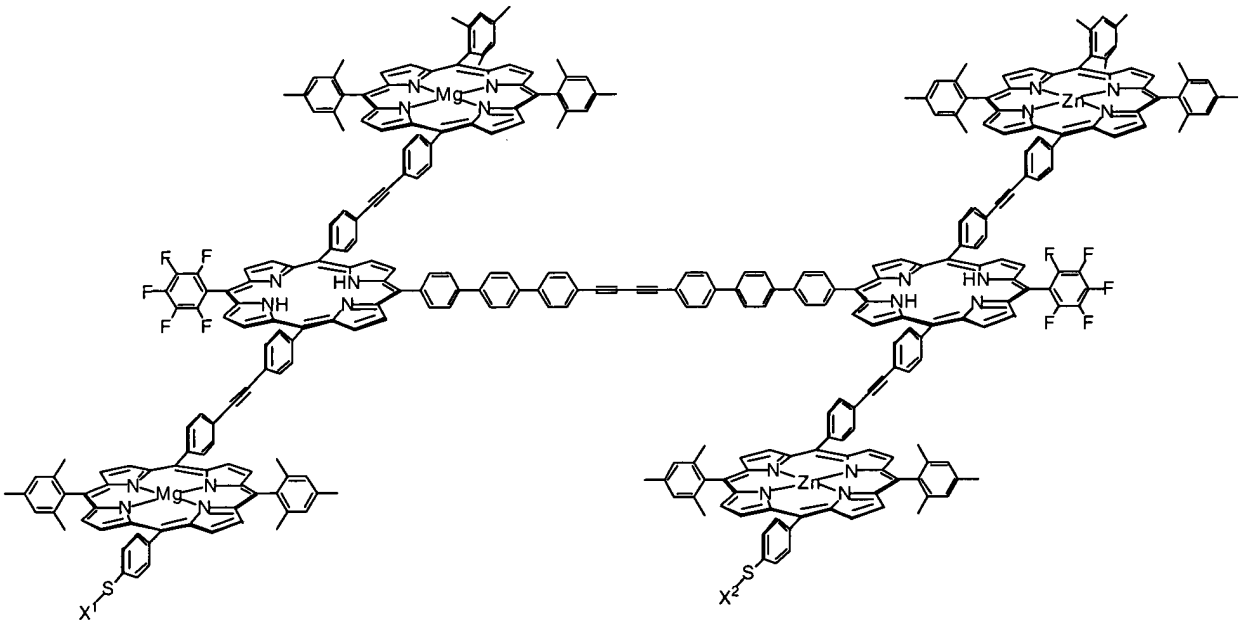
S^1, S^2, S^3, S^5, S^6, and S^7 are the same;

K^1, K^2, K^3, K^4, K^5, K^6, K^7, and K^8 are the same

J^1, J^2, J^4 and J^5 are the same; and

M^1 and M^2 are different.

Claim 72 (Original): The storage medium of claim 71, wherein said storage molecule has the formula:



wherein X^1 and X^2 are independently selected from the group consisting of H and a substrate.

Claims 73-88 (Canceled).

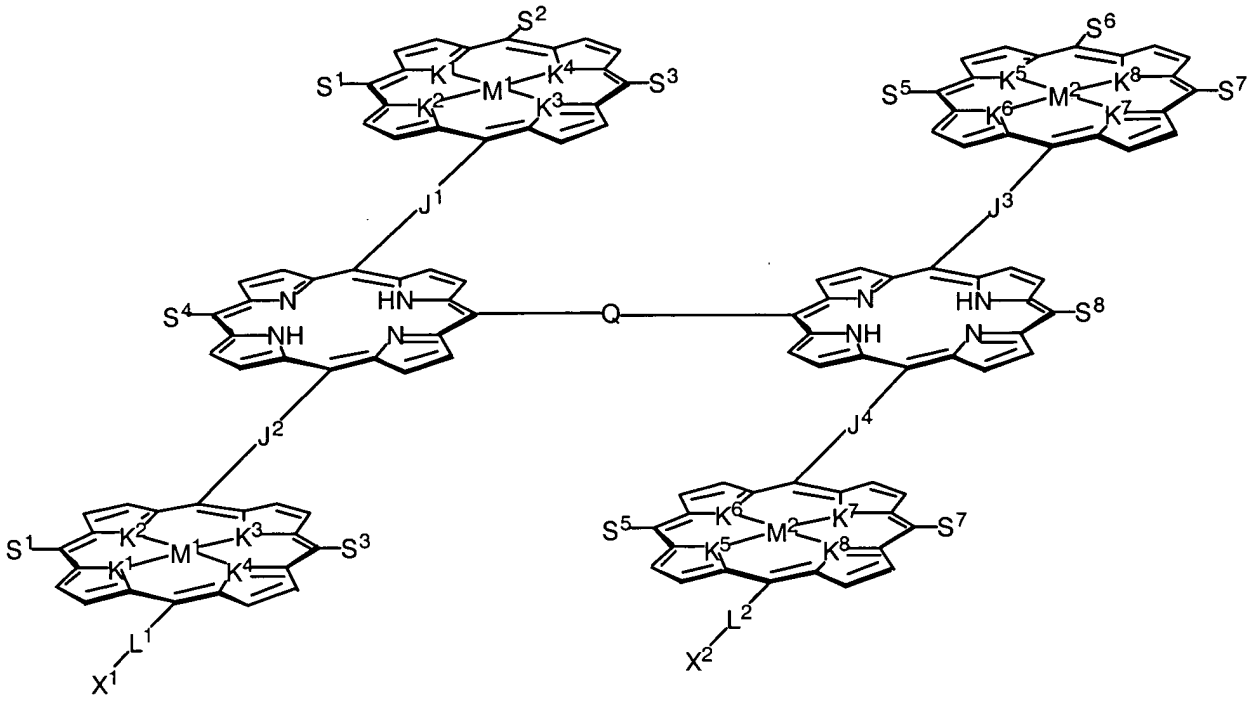
Claim 89 (Original): The storage medium of claim 60, wherein each storage molecule is present at a discrete storage location on a substrate.

Claim 90 (Original): The storage medium of claim 60, wherein the storage molecule is in contact with a dielectric material imbedded with counterions.

Claim 91 (Original): The storage medium of claim 60, wherein said storage molecule comprises two or more covalently linked redox-active subunits.

Claims 92-94 (Canceled).

Claim 95 (Original): A molecule for the storage of information, said molecule having the formula:



wherein

M^1 and M^2 are independently selected metals;

S^1, S^2, S^3, S^4, S^5, S^6, S^7, and S^8 are independently selected from the group consisting of aryl, phenyl, cycloalkyl, alkyl, halogen, alkoxy, alkylthio, perfluoroalkyl, perfluoroaryl, pyridyl, cyano, thiocyanato, nitro, amino, alkylamino, acyl, sulfoxyl, sulfonyl, imido, amido, and carbamoyl;

K^1, K^2, K^3, K^4, K^5, K^6, K^7, and K^8 are independently selected from the group consisting of are independently selected from the group consisting of N, O, S, Se, Te, and CH;

L^1 and L^2 are independently selected linkers; and

X^1 and X^2 are independently selected from the group consisting of a substrate, a reactive site that can covalently couple to a substrate, and a reactive site that can ionically couple to a substrate.

Claims 96-97 (Canceled).

Claim 98. A method of storing data, said method comprising:

i) providing an apparatus according to claim 1; and

ii) applying a voltage to said electrode at sufficient current to set an oxidation state of said storage medium.

Claim 99 (Original): The method of claim 98, wherein said voltage ranges up to about 2 volts.

Claim 100 (Original): The method of claim 98, wherein said voltage is the output of an integrated circuit.

Claim 101 (Original): The method of claim 98, wherein said voltage is the output of a logic gate.

Claim 102 (Original): The method of claim 98, further comprising detecting the oxidation state of said storage medium and thereby reading out the data stored therein.

Claim 103 (Original): The method of claim 102, wherein said detecting the oxidation state of the storage medium further comprises refreshing the oxidation state of the storage medium.

Claim 104 (Original): The method of claim 102, wherein said detecting comprises analyzing a readout signal in the time domain.

Claim 105 (Original): The method of claim 102, wherein said detecting comprises analyzing a readout signal in the frequency domain.

Claim 106 (Original): The method of claim 105, wherein said detecting comprises performing a Fourier transform on said readout signal.

Claim 107 (Original): The method of claim 102, wherein said detecting utilizes a voltammetric method.

Claim 108 (Original): The method of claim 102, wherein said detecting utilizes impedance spectroscopy.

Claim 109 (Original): The method of claim 102, wherein said detecting comprises exposing said storage medium to an electric field to produce an electric field oscillation having characteristic frequency and detecting said characteristic frequency.

Claim 110 (Original): The method of claim 98, wherein said storage medium comprises a molecule selected from the group consisting of a porphyrinic macrocycle, a metallocene, a linear polyene, a cyclic polyene, a heteroatom-substituted linear polyene, a heteroatom-substituted cyclic polyene, a tetrathiafulvalene, a tetraselenafulvalene, a metal coordination complex, a buckyball, a triarylamine, a 1,4-phenylenediamine, a xanthene, a flavin, a phenazine, a phenothiazine, an acridine, a quinoline, a 2,2'-bipyridyl, a 4,4'-bipyridyl, a tetrathiotetracene, and a peri-bridged naphthalene dichalcogenide.

Claim 111 (Original): The method of claim 110, wherein said storage medium comprises a molecule selected from the group consisting of a porphyrin, an expanded porphyrin, a contracted porphyrin, a ferrocene, a linear porphyrin polymer, and a porphyrin array.

Claim 112 (Original): The method of claim 110, wherein said storage medium comprises a porphyrinic macrocycle substituted at a β- position or at a meso- position.

Claim 113 (Original): The method of claim 110, wherein said molecule has at least eight different and distinguishable oxidation states.

Claim 114 (Original): In a computer system, a memory device, said memory device comprising the apparatus of claim 1.

Claim 115 (Original): A computer system comprising a central processing unit, a display, a selector device, and a memory device, said memory device comprising the apparatus of claim 1.